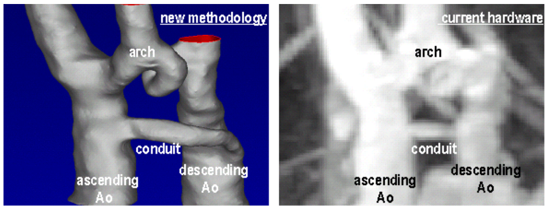
play substantial improvement over alternatives, as shown below. Approximately 50 rare cardiac structures including Fontan and atypical aortic anatomies have been reconstructed.
Conclusions
Benefits of our technique are particularly evident when complex vascular configurations complicate reconstruction. Our methodology creates a powerful tool allowing physicians to analyze and manipulate vascular structures interactively. This technology enables the execution of virtual operations with which surgeons can create and evaluate potential post-operative anatomies.



3D Visualizations of corkscrew aorta with conduit

4:30 p.m.

854-3 Fundamental Errors in Current Applications of Gorlin Formula and Continuity Equation for Aortic Valve Anatomical Orifice Area Estimate

Karl Isaaz, Sylvie Schouvey, University of Saint Etienne, Saint Etienne, France

Hypothesis. Aortic stenosis (AS) valve orifice area (AVA) can be calculated either from flow rates and pressure gradients (PG) by the Gorlin formula (AVAg = flow rate/K.PG^0.5) or from subvalvular and transvalvular velocities (Vsub,Vtv) by the continuity equation (AVAc = LVoutflow tract area .Vsub/Vtv). In current practice, mean values for flow rates, PG and velocities are used in both formula to derive mean AVA. However, as flow is pulsatile, mean AVA should mathematically be calculated by time averaging of instantaneous values for AVAg or AVAc. We hypothesized that such fundamental errors may significantly alter the estimate of actual mean AVA. Methods. A computer model of AS with AVA variability during ejection (T) was developed. Vtv, pressure recovery (PR), PG and PGnet (PG-PR) were computerized based on hydrodynamic equations. Mean AVA was estimated from mean AVAc and 8 Gorlin formula : g1= mean flow rate/ 44.3meanPG^0.5, g2 = mean flow rate/50meanPG^0.5, g3 = mean flow rate/ 44.3PGnet^0.5, g4= mean flow rate/50PGnet^0.5, g5 = 1/T int[flow rate(t)/ 44.3PG(t)^0.5.dt], g6 =1/T int[flow rate(t)/50PG(t)^0.5.dt], g7 =1/T int [flow rate(t)/ 44.3PGnet(t)^0.5.dt] and g8 = 1/T int [flow rate(t)/50PGnet(t)^0.5.dt]. Results : Table. Conclusion: Significant errors in mean AVA estimate result from Gorlin and continuity equations when mean values for flow, pressure gradients and velocities are used, Gorlin formula based on time averaging of instantaneous values for AVAg with K = 50 provides the best results

For mean AVA = 0.70cm^2

AVAc	AVAg1	AVAg2	AVAg3	AVAg4	AVAg5	AVAg6	AVAg7	AVAg8
0.78	0.85	0.75	0.92	0.82	0.79	0.70	0.86	0.76

4:45 p.m.

854-4 Clinical Application of Eigenvalue Analysis and the Derived Electrocardiogram as a Real-Time Marker for Infarction

David M. Schreck, Atul Prakash, Cristian Brotea, Sumit Shah, Jeffrey Sparrow, Capital Health System, Trenton, NJ, Atlantic Health System, Summit, NJ

Background: The electrocardiogram (ECG) may be described as a lead-vector array and may be derived from 3 standard leads using a simplex optimization (SO) transformation matrix. Each ECG array has associated eigenvalues (EV) that can be identified by Factor Analysis (FA) to quantify the ECG information space.
Objective: To calculate the EVs of normal and infarction, measured and derived 12-lead standard ECGs, and to determine whether the EVs can distinguish acute ECG pathology using this computer-aided diagnostic technique.
Methods: Thirty-four standard 12-lead ECGs, including 22 normal and 12 with acute myocardial infarction (AMI), were acquired and digitized yielding 300 voltage-time points for each of the 8 measured ECG leads. Each of the 34 measured ECGs was also derived from leads I, aVF, and V2 using a SO transformation matrix. EVs for each measured and derived 300 x 8 voltage-time array were calculated using FA.ANOVA was used to test for the statistical significance of the contribution of each EV% to the information content in each patient array.
Results: FA of the 34 measured ECGs confirmed that 3 leads account for 99.2% ± 0.22% of the information content in the 12-lead ECG set of test cases. No diagnostic morphologic differences between measured and derived ECGs were noted. Significant differences ($p < 0.05$) between AMI and normal measured ECGs were detected at EV3%, EV4%, EV5%, EV6%, and EV7%. Significant differences were also detected at EV3% for derived ECGs (EV4-EV8 are null by definition in a 3 lead model for the derived 12-lead ECGs). The sum of EV3% through EV8% were plotted and demonstrated complete differentiation of normal ECGs from infarction ECGs in all 34 cases for both measured and derived ECGs.
Conclusions: This study showed that the EVs in a standard ECG may differentiate normal from AMI pathology. This computer-aided diagnostic calculation is performed instantaneously in real-time to enhance emergency care and patient observation capabilities. The 12-lead ECG can be derived from a SO transformation matrix using only 3 measured leads from which the EVs can be calculated. We propose that the ECG eigenvalues are a new marker for real-time continuous prediction of AMI.

ORAL CONTRIBUTIONS

889 Outcomes Research: Novel Approaches

Wednesday, March 10, 2004, 10:30 a.m.-Noon
Morial Convention Center, Room 217

10:30 a.m.

889-1 A Randomized Controlled Trial of Internet-Based Academic Detailing in Heart Failure: Failure to Engage or Change

Nancy M. Allen LaPointe, Judith M. Kramer, Elizabeth R. DeLong, Lawrence H. Muhlbaier, Anita Chen, Bradley G. Hammill, Charles B. McCants, Robert M. Califf, Duke Clinical Research Institute, Durham, NC

Background: Despite a survival benefit and guideline recommendation for beta-blockers (BB) in heart failure (HF), BB are underused in clinical practice.
Methods: In year 2000, patients with EF ≤ 40% or a clinical diagnosis of HF were identified in the Duke Databank for Cardiovascular Disease (DDCD) and grouped by the referring medical practice. Practices with ≥ 15 patients in DDCD were identified for a prospective, randomized study using a multifaceted intervention to improve BB use in HF patients. All physicians in each practice were asked to participate; however, practices were randomized if at least one physician in the practice agreed to participate. Intervention practices received provider education using an interactive, Internet-based program with thought leaders; patient education materials; feedback on their HF patients' BB use; and access to HF experts via telephone. The primary outcome was a comparison between intervention and control practices of the proportion of HF patients self-reporting BB use on their first routine DDCD follow-up in the post-intervention year. A random effects model was used for the analysis.
Results: Sixty-six of 319 physicians (21%) agreed to participate, representing 45 of 66 medical practices (68%) in 3 states. Twenty-two practices were randomized to control and 23 to intervention. Only 11 of 120 (9%) eligible physicians representing 9 intervention practices accessed the Internet program. Post-intervention, 2,631 patients (1,701 in intervention practices and 930 in control practices) completed DDCD follow-up. There was no significant difference in the proportion of patients self-reporting BB use between intervention and control practices (46% vs 47%, respectively). **Conclusion:** Extension of the concept of academic detailing using the Internet in a multifaceted intervention was not successful in either soliciting participation or changing practice in the outpatient setting. The development of new economic or quality incentives in the ambulatory setting is needed to influence prescribing in outpatients.

10:45 a.m.

889-2 Activating Patients: Drivers of Self-Efficacy in Heart Failure

Mark W. Conard, C. Keith Haddock, WS Carlos Poston, Saif Rathore, Harlan M. Krumholz, John A. Spertus, Megan Pinkston, Mid America Heart Institute/St. Luke's Hospital, Kansas City, MO

Background: The cornerstone of modern heart failure (HF) care is the engagement of patients in managing their disease. Understanding patient factors associated with less confidence in self-management can identify opportunities to tailor educational materials to those who most need them. We examined a range of demographic, clinical and health status characteristics associated with patients' sense of Self-efficacy.
Methods: 547 HF patients (EF<40%) were enrolled from 13 North American centers in an observational study assessing their health status. Self-efficacy was quantified with the Kansas City Cardiomyopathy Questionnaire (KCCQ), in which patients are asked whether they know what to do to prevent their HF from getting worse or whom to call if their HF worsens. Scores range from 0-100 where higher scores reflect greater confidence in self-management. Potential predictive characteristics for patients' self-efficacy were age, race (black vs. white), marital status, gender, education level (college graduate vs. not), ejection fraction, NYHA class, body mass index, number of medications, self-reported difficulty taking medications (not difficult vs. somewhat-to-extremely difficult), income and vital signs.
Results: In multivariate models, independent predictors of Self-efficacy were race (+6.1±1.9 points, p=0.002), gender (-3.9±2 for men, p=0.047), educational level (+4.3±2.1 for college graduates, p=0.04), NYHA class (-3.3±1.1 per class, p=0.004), age (-0.2±0.06 points/year, p=0.01) and difficulty taking medications (-12.8±2.4, p<0.001). The model accounted for 11.2% of the variance in Self-efficacy scores.
Conclusions: Patients most likely to have a poor sense of Self-efficacy were older,